



MEMORY RECORDER/ANALYZER
EDX-2000A

HARDWARE
INSTRUCTION MANUAL

Thank you for purchasing KYOWA's product EDX-2000A Memory Recorder/Analyzer.
Read this manual carefully to ensure the long life and reliability of the product.
The product should not be used in any manner other than as described in this Manual.
This manual covers only the hardware operating instructions. For details on software,
refer to the "Instruction Manual for Software."

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This Manual contains operating instructions for the EDX-2000A, CDV-40A and RCU-40A hardware.

STANDARD ACCESSORIES

The following accessories are packed with the memory recorder/analyzer system. When unpacking, check the contents to ensure that all accessories are enclosed.

Grounding wire	1
AC power cable (P-18)	1
DC power cable	1
Conversion adapter (CM-33)	1
AC fuse (3.15 A: in AC inlet)	1
DC fuse (30 A)	1
Instruction Manual (CD-R)	1
Simplified Instruction Manual	1

OPTIONAL ACCESSORIES

- Conditioner cards:	See catalog.
- Dummy panel:	EDX2000-DUMMY
- Remote control unit:	RCU-40A
- Input cable for 8-channel sensor (for CDV-40A)	U-38 to U-48 (See 3-3, "CONNECTING SENSORS")
- Data analysis software:	DAS-100A (Ver. 01.52 or later; compatible with KS2)

SAFETY PRECAUTIONS

Do not forget to read the safety precautions prior to use.

The EDX-2000A Memory Recorder/Analyzer System is designed in accordance with the criteria described in 9, "HARDWARE SPECIFICATIONS," and 10, "SOFTWARE SPECIFICATIONS." DO NOT use the EDX-2000A in an environment exceeding the scope of those specifications. Or, the system may be damaged.

PRIOR TO USE

For safe use of the EDX-2000A, be sure to read the safety precautions described below.

KYOWA ELECTRONIC INSTRUMENTS CO., LTD. assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.

SAFETY SYMBOLS

For safety operation of the EDX-2000A, the following "WARNING" and "CAUTION" symbols are used in SAFETY PRECAUTIONS of this manual and indicated on the product.

 WARNING	Improper operation of the system may result in severe injury or death of the operator.
 CAUTION	Improper operation of the system may result in injury to the operator and physical damage to the system.



WARNING

- **Power supply**
To prevent fire hazards, ensure that the power supply voltage specified for the EDX-2000A matches the local line voltage before connecting the system to the AC power outlet or DC power supply.
- **Inflammable Environment**
To prevent the risk of fire and explosion, do not operate the EDX-2000A in area exposed to flammable gases, vapors or dust.
- **Abnormal Condition**
To prevent fire hazards, if smoke is emerging from the EDX-2000A, immediately turn OFF the power switch and disconnect the power cable from the AC power outlet to terminate the system operation. Likewise, when the DC power supply is used, immediately turn the power switch to OFF and disconnect the DC power cable from the power outlet, thereby halting system operation.
- **Protective Ground**
Be sure to ground the “GND” terminal. Failure to do so will pose the risk of electric shock, deteriorated performance and system failure.
- **Maximum Input Voltage Range for Measurement**
Strain/voltage measurement card: Do not apply an input voltage exceeding the range specified for the CDV-40A. Failure to do so will pose the risk of electric shock, deteriorated performance and system failure. See the following precautions when measuring the DC voltage of a battery, power supply, etc.
 - (1) Use a tester, etc. to measure the voltage between negative sides of the DC voltage in order to ensure that the voltage is approximately 0 V.
 - (2) Confirm that the voltage between the negative side of the DC voltage and the GND terminal of the EDX-2000A is approximately 0 V.
 - (3) When connecting an input, correctly connect the positive and negative sides.
 - (4) The input voltage limits of the CDV-40A are ± 10 V. Do not apply an input voltage exceeding the said range.
Failure to comply with the above precautions will result in a short circuit of the signal source (e.g. the DC power supply) to be measured in the CDV-40A card, thus causing a fire hazard.
- **Environment with excessive vibration**
Do not set the display portion upright in a vibrating environment. Or, the display portion may move to contact a person or surroundings causing injury to the person or damage to the EDX-2000A. Always use in the fixed position in such environment.



CAUTION

Use the EDX-2000A in the specified operating temperature range of 0 to 40°C.

- Use at temperatures exceeding the specified range may lower the performance and cause troubles.
- If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.

Use the EDX-2000A in the specified operating humidity range of 20% to 80%RH.

- Use in a humid place exceeding the specified range or where it is exposed to splashing water may lower the performance and cause troubles.

Do not use EDX-2000A immediately after the change in the environment.

- Leave the EDX-2000A as it is to make it familiar with the environment.
- Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation, which may result in lower performance and troubles.

Do not use the EDX-2000A where it is subject to significant vibration or impact.

- The vibration resistance of the EDX-2000A is 29.42 m/s^2 (3 G) at 5 to 55 Hz (when in operation) and 49.03 m/s^2 (5 G) at 5 to 55 Hz (when not in operation).
- The impact resistance of the EDX-2000A is 196.1 m/s^2 (20 G)/11 ms.
- Use the EDX-2000A in an area where vibration and impact can be kept within the scope of specifications.
- Continuous vibration or severe impact may cause deteriorated performance and system failure.
- When mounting the EDX-2000A on the vehicle, always set it on the car seat and securely fix it a band and the like. Do not directly mount it on the vehicle chassis. Or unexpected vibration or impact may be applied to the EDX-2000A. At this time, set it on a vibration isolation table to reduce the applied vibration and impact.

Do not use the EDX-2000A in strong electromagnetic fields.

- Use the EDX-2000A in an environment where magnetic field is acceptable to the PC.
- Performance may be lowered and erroneous operation and troubles may result if it is used near a telemetry system, microwave oven, electric furnace or any other equipment generating a strong magnetic field.

Do not use the EDX-2000A under poor conditions.

- Operate the EDX-2000A within the range of 100 to 120 VAC, 190 to 240 VAC or 10 to 30 VDC. The power supply used for the EDX-2000A should not experience an instantaneous power failure and be free from noise.

Do not turn ON the power switch immediately after turning it OFF.

- After turning OFF the power switch, wait until the power supply is shut OFF automatically before turning ON the power switch again. Do not disconnect the power plug from the AC outlet or DC power supply. Or, internal hard disk in the memory recorder/analyzer may be destroyed and the system may not startup again.

Do not pull cord and cables.

- Lay cords and cables with a certain allowance so that any unreasonable force may not be applied to the connections.
- Pulling or unreasonable force may cause troubles or interrupt the measurement.

Take proper precautions when using a PC card in an environment with vibration.

- Do not take measurement while the PC card remains inserted in a vibrating environment, which may cause a system failure or PC card failure.

Do not seal ventilation holes provided for a fan located at the back and two fans located at the front.

- If there is not enough space to radiate heat, temperature in the EDX-2000A may increase to lower the performance and cause troubles.

NOTATIONS USED IN THE INSTRUCTION MANUAL

Informational Notes

Certain notations are used as necessary to urge attention to information that requires special attention in the handling of the system, and to information provided for reference purposes.

Examples of Notations

NOTE

The information provided merits special attention in the handling of the system.

MEMO

The information provided is useful as a reference.

1. OUTLINE OF THE PRODUCT

1-1 OUTLINE

The EDX-2000A is an all-in-one measuring instrument that is capable of measuring, displaying, recording and analyzing data through connections with a variety of sensors, and that features excellent levels of general utility and expandability.

The EDX-2000A system is available in two models, one offering up to 32 channels and the other up to 64 channels:

- EDX-2000A-32 Maximum 32 channels (4 conditioner slots)
- EDX-2000A-64 Maximum 64 channels (8 conditioner slots)

The use of a high capacity hard disk provides approximately 1.7 hours of data recording at a 10 kHz sampling rate with 32 channels active (when the data capacity is 4 gigabytes). The recorded and processed data can easily be transferred online or offline to the PC.

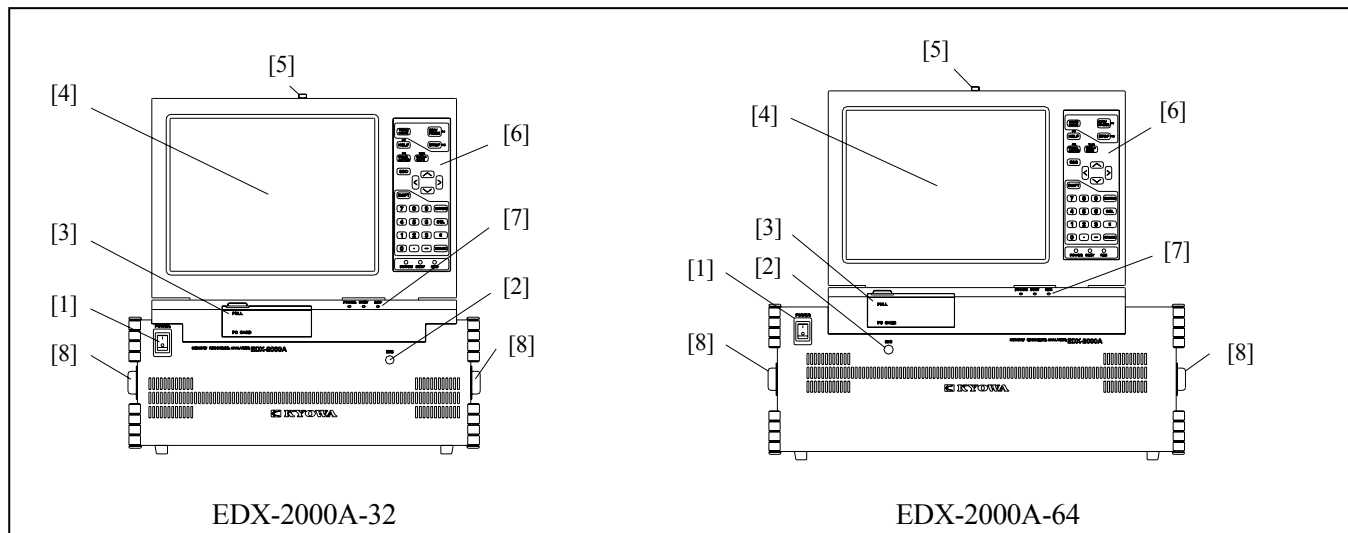
1-2 FEATURES

- Analytical processing tasks (FFT analysis and histogram analysis) can be performed while recording data, so that the input monitored data and processing results can be viewed onscreen.
- An optional conditioner card may be installed in this all-in-one measuring instrument.
- An internal battery maintains operation in the event of a momentary loss of power.
- Long-term data recording is available in the internal hard disk.
- Voice memo can be recorded simultaneously with data recording.
- CAN data can be recorded using an optional CAN card.
- Analog output can be reproduced using an optional DA card.
- The analyses of FFT data, histogram data and arithmetic operations can be conducted.
- Data from 32 channels (simultaneous sampling) can be recorded at a sampling frequency of 100 kHz.
- The EDX-2000A is controlled quickly and easily through interactive operation.
- The handy ATA card and internal hard disk cards are used to transfer data to the PC.
- Data files can be readily transferred simply by connecting a LAN interface, like wise using the PC.
- Optional data analysis software (DAS-100A: Ver. 01.52 or later) is available.

2. CONTROLS AND INDICATORS

2-1 FRONT

The front views of the EDX-2000A models with their displays in the upright position are shown below:



- 1) “POWER” switch The power is turned ON or OFF when this power supply switch is pressed to the “I” position or “O” position, respectively. When the switch is turned OFF, the internal data is saved and then, the power is automatically shut OFF.

NOTE

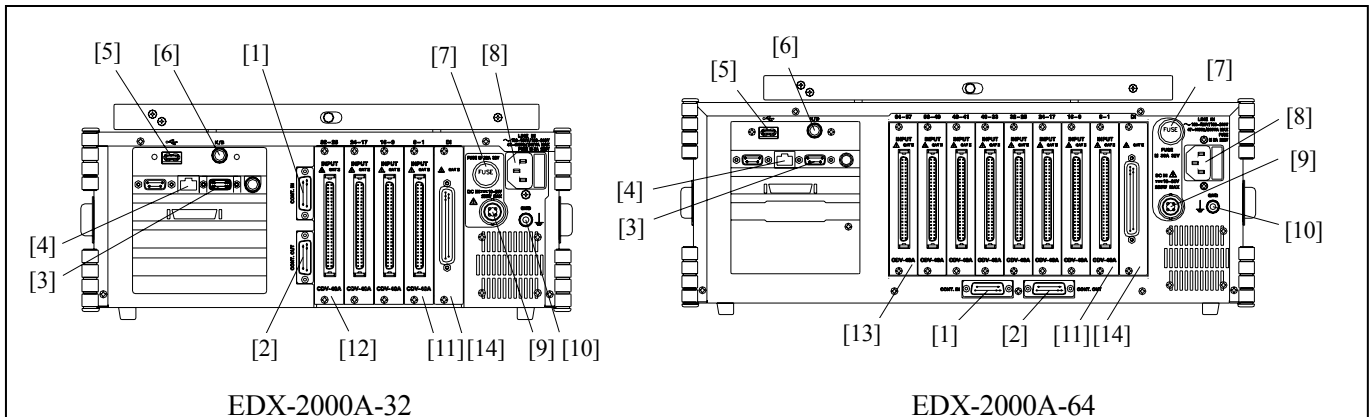
Do not disconnect the power plug from the power outlet or DC power supply when the POWER switch is ON. When the POWER switch is turned OFF, wait until the power is shut OFF before disconnecting the power plug. Once you turn OFF the POWER switch, do not operate the POWER switch again until the power is shut OFF. Failure to observe these precautions may destroy the internal hard disk and prevent the EDX-2000A from starting again.

- 2) “MIC” connector The MIC connector is used to connect the external microphone. A commercially available microphone should be connected to this connector. It’s a 3.5 mm stereo “mini jack” connector with which the condenser type microphone is used for recording voice memos.
- 3) “PC CARD” By pulling open “PULL,” you can see the PC card connector. The ATA card and hard disk type card can be used.
- 4) Display A 10.4 inch TFT color LCD.
- 5) Display knob By sliding the knob to the right, the display can be pulled open and into the upright position. The above figure is the front view of the EDX-2000A with the display set upright. Moving the display to the rear will lock the display in position.
- 6) Sheet key Sheet keys are used for controlling the EDX-2000A. LEDs are provided at the bottom to indicate various statuses.
- 7) Status display LED LEDs are provided to indicate the status of main unit. These LEDs are the same as those provided at the bottom of the sheet keys. Details of LED status are described in the table on the next page.

Status \ LED	POWER	BUSY	REC
Green LED ON	Power ON state	Accessing the internal hard disk	Recording
Green LED flickers	Getting ready to turn OFF the power (After saving the internal data, the power automatically turns OFF .)		Pausing
Orange LED ON	Charging the internal battery		
Orange LED flickers	Discharging the internal battery		
Red LED ON	Internal battery faulty		Recording voice memo
Red LED flickers	DC power supply voltage dropping (The LED flickers when the voltage drops to less than approx. 11 V.)		
Red and Orange LEDs alternately ON	Internal battery operating (AC or DC power supply is lost)		

- 8) Handles A pair of handles is provided for easy transportation of the EDX-2000A.

2-2 REAR



- | | |
|-------------------------------|--|
| 1) CONT IN connector | The CONT IN connector is used for a dedicated remote control unit or for synchronized operation of multiple systems. |
| 2) CONT OUT connector | The CONT OUT connector is used for synchronized operation of multiple systems. |
| 3) External monitor connector | This connector is used to connect an external monitor. |
| 4) LAN connector | The LAN connector is used for data transmission. |
| 5) USB connector | The USB connector is used for universal serial bus communications. |
| 6) Keyboard connector | This connector is used to connect the external keyboard. |
| 7) DC power supply fuse | This fuse (6.3 x 32 mm, 30 amp) is used for the DC power supply. |
| 8) AC inlet socket | This AC power supply connector should be connected to the AC power outlet using the AC power cable supplied with the EDX-2000A. The socket has an internal 5 x 20 mm, 3.15 amp fuse. |
| 9) DC power supply connector | Voltage of this DC power supply connector ranges from 10 to 30 VDC. For connector types and pin numbers, see 8, "CONNECTOR PIN ASSIGNMENT." |

NOTE

When the POWER switch is turned OFF, do not disconnect the power plug from the power outlet or DC power supply until the power is shut OFF. Once the POWER switch is turned OFF, do not operate the POWER switch again until the power is automatically shut OFF. Failure to observe these precautions may destroy the internal hard disk and prevent the EDX-2000A from starting again.

- | | |
|------------------|--|
| 10) GND terminal | Always ground the GND terminal of the EDX-2000A. |
|------------------|--|

MEMO

The "GND" terminal is connected to the casing, the common of the internal power supply and the negative side of the DC power supply input connector.

- | | |
|--------------------------------|------------------------------------|
| 11) 1-CH to 8-CH conditioner | Conditioner for channels 1 to 8. |
| 12) 25-CH to 32-CH conditioner | Conditioner for channels 25 to 32. |
| 13) 57-CH to 64-CH conditioner | Conditioner for channels 57 to 64. |

MEMO

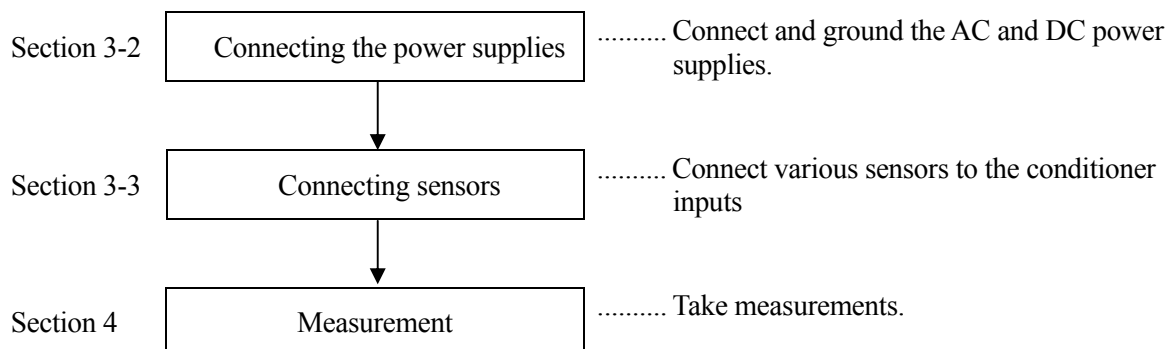
The channel number is determined by the position where the conditioner is inserted. The channel numbers are assigned from right to left as seen from the rear.

- | | |
|-------------|--|
| 14) DI card | The DI card is used for digital input. |
|-------------|--|

3. INSTALLING THE EDX-2000A

3-1 INSTALLATION PROCEDURE

This section describes required procedures for installing the EDX-2000A and preparing for measurements. Use the following procedures to complete the installation.



3-2 CONNECTING THE POWER SUPPLIES

3-2-1 Connecting the AC Power Supply

Supply AC power to the EDX-2000A with the attached AC power cable.

Check the power supply voltage before connecting the power cable to the AC power outlet.

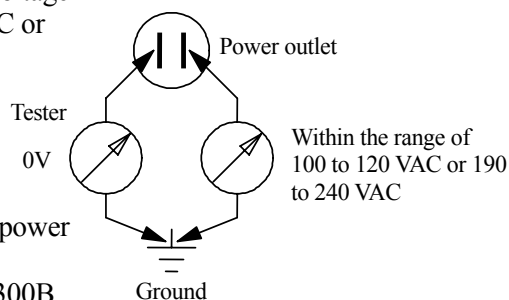
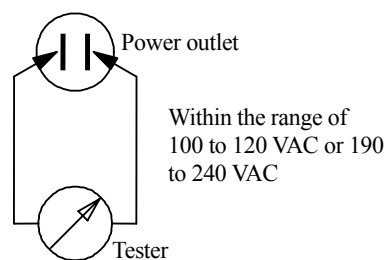
The operating power supply voltage range of the EDX-2000A is 100 to 120 VAC/190 to 240 VAC.

Always operate the EDX-2000A within the specified voltage range.

The EDX-2000A should never be connected to the power supply with voltage outside the above specified voltage range or voltage potentials of the terminals exceed the level of power supply voltage relative to the ground. Doing so will cause system failure and accidents.

The power supply voltage should be checked according to the procedure described below.

- 1) Use the tester to measure the voltage between the AC power outlet terminals and ensure that the voltage is within the range of 100 to 120 VAC or 190 to 240 VAC.
- 2) Use the testers to measure the voltage levels between the ground and each of the AC power outlet terminals to ensure that one voltage level is 0 V and the other is within the range of 100 to 120 VAC or 190 to 240 VAC.
- 3) If the EDX-2000A is used at job site where induction motors, electric welder and other devices that generate noise are used, power supply condition may be insufficient due to noise. It is recommended to use KYOWA's insulation transformer (UPT-300B separately sold) or noise cut transformer.



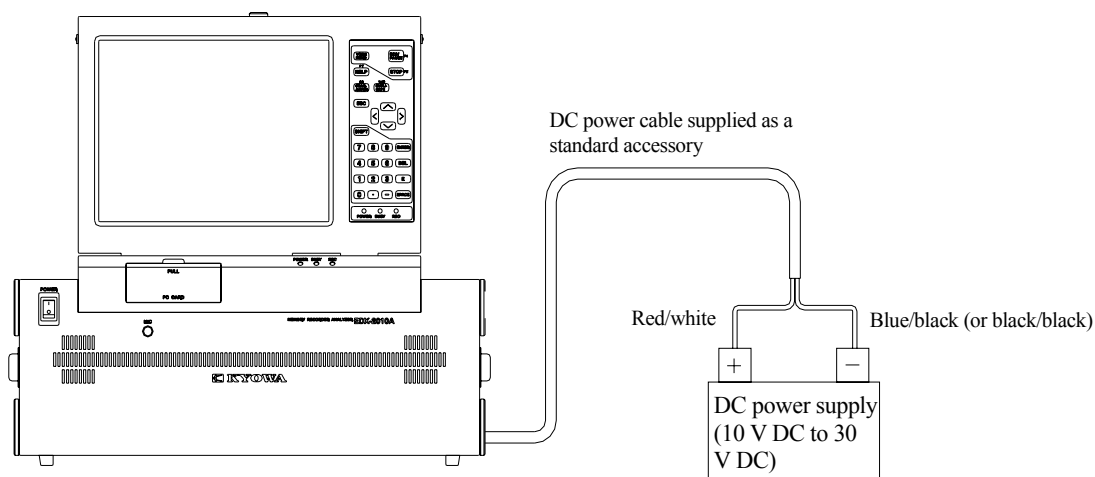
3-2-2 Connecting the DC Power Supply

Supply AC power to the EDX-2000A with the attached DC power cable.

Check the power supply voltage before connecting the DC power cable.

The operating power supply voltage range of the EDX-2000A is 10 to 30 VDC. Always operate the EDX-2000A within the specified voltage range.

The EDX-2000A should never be connected to the power supply with voltage is outside the above specified voltage range or voltage potentials of the terminals exceed the level of power supply voltage relative to the ground. Doing so will cause system failure and accidents.



DC Power Supply Connection Diagram

NOTE

- The negative side of the DC power supply is connected to the “EDX-2000A housing” and the “GND” terminal. When measuring the DC power supply voltage, do not allow the positive power cable to come in contact with the casing or connect it to the negative side of the CDV input. Or, EDX-2000A may be damaged.
- When using an automotive battery as the DC power supply, ensure that the negative side of the battery is connected to the body of the vehicle.
- An automotive battery whose positive side is connected to the body of the vehicle cannot be used. In that case, a separate battery should be provided for the EDX-2000A.

MEMO

When an automotive battery is used as the DC power supply, even if the power supply voltage temporarily drops due to a starter, etc, the internal battery in the EDX-2000A maintains the power supply voltage, ensuring an uninterrupted supply of power for the system operation.

NOTE

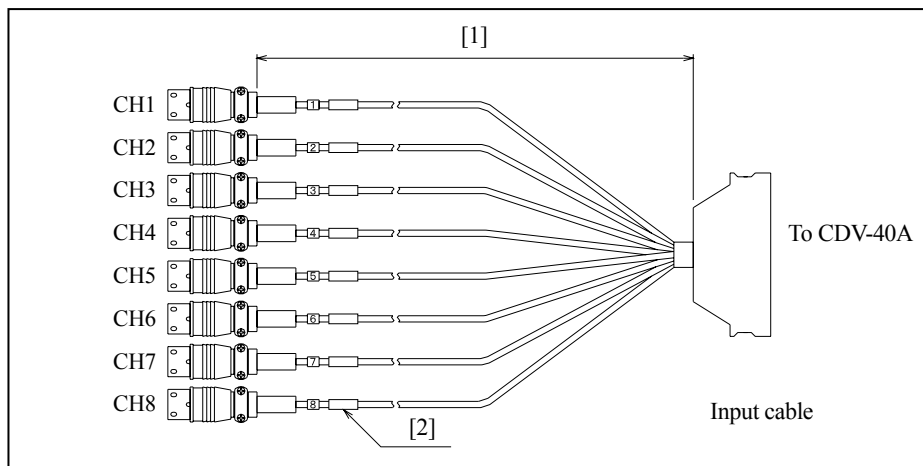
- When mounting the EDX-2000A on the vehicle, always set it on the car seat and securely fix it a band and the like. Do not directly mount it on the vehicle chassis. Or unexpected vibration or impact may be applied to the EDX-2000A. At this time, set it on a vibration isolation table to reduce the applied vibration and impact.

3-3 CONNECTING SENSORS

This section explains how to connect sensors to the CDV-40A strain/voltage measurement card (hereinafter referred to as the CDV-40A).

Use dedicated input cables (optional) for connecting sensors to the CDV-40A. The applicable input cables are shown in the following table.

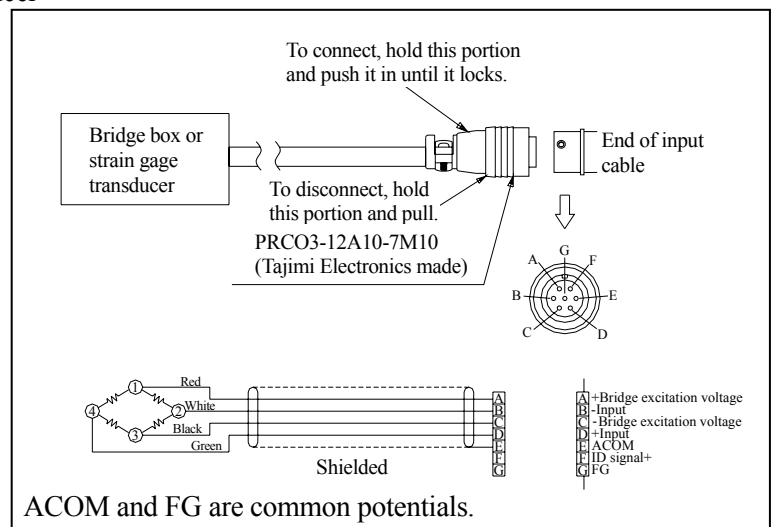
Item	Model	Cable length (Figure [1])	Color of heat shrinkable tube (Figure [2])	Item	Model	Cable length (Figure [1])	Color of heat shrinkable tube (Figure [2])
Input cable	U-40	50cm	N/A	Input cable	U-46	50cm	Blue
	U-41		Brown		U-47		Purple
	U-42		Red		U-48		Gray
	U-43		Orange				
	U-44		Yellow		U-38	1.5m	N/A
	U-45		Green		U-39	1.0m	N/A



The CDV-40A is capable of performing strain measurement and voltage measurement. The input cable should be connected as described below:

1) When using a strain gage or strain gage transducer

When measuring the output of the strain gage or strain gage transducer, connect the bridge box or strain gage transducer as shown in the figure at right. Before recording data, select the strain mode and monitor the noise. If excessive noise is measured, ground the ground terminal of the bridge box or connect it to the GND terminal of the EDX-2000A, whichever results in less noise.

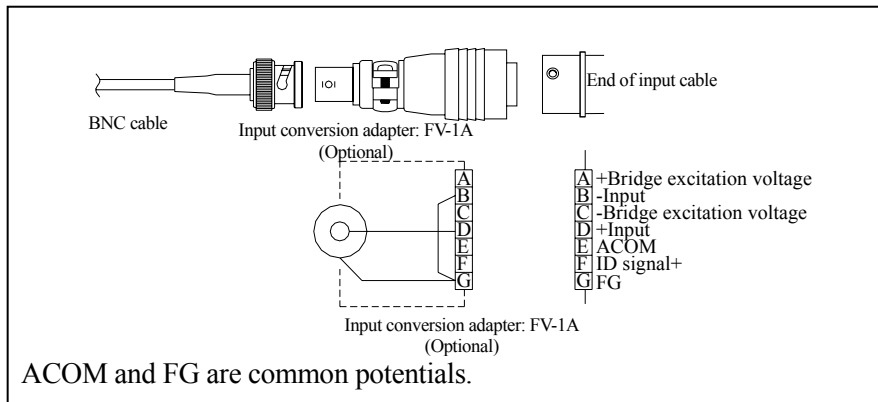


NOTE

The F terminal of each channel input for the CDV-40A is intended for sensor ID signals. Connecting any other signal to this terminal may prevent the EDX-2000A from recognizing all conditioners installed in the system. If the EDX-2000A does not recognize the conditioners, the startup screen will display “UNKNOWN” when it should display the name of the conditioner (e.g. CDV-40A) in the normal state, resulting to unable the measurement.

- Strain generator: CAB-120D, 350D and WDS-10 are not available because the F and A terminals are short-circuited.
- It should be noted that when using a transducer with a remote sensing function, always connect by locating the connection cable (N-81 to N-85) between the EDX-2000A and the transducer..

2) When applying an input voltage



When measuring the voltage, connect the FV-1A input conversion adapter (optional) to a quick mating connector using the BNC connector. Select the voltage mode to perform monitoring. For excessive noise, connect the negative side of the voltage signal source to the GND terminal of the EDX-2000A.

WARNING

● Maximum Input Voltage Range for Measurement

Strain/voltage measurement card: Do not apply an input voltage higher than the range specified for the CDV-40A. Doing so may cause an electric shock, deteriorated performance and system failure.

Take the following precautions when measuring the DC voltage of a battery, power supply, etc.

- (1) Use a tester or the like to measure the voltage between negative sides of the DC voltage and confirm that the voltage is approximately 0 V.
- (2) Confirm that the voltage between the negative side of the DC voltage and the GND terminal of the EDX-2000A is approximately 0 V.
- (3) When connecting the input, correctly connect the positive and negative sides.
- (4) Maximum input voltage of the CDV-40A is ± 10 V. Do not apply input voltage exceeding that range.

Failure to comply with the above precautions will result in a short circuit of the signal source (e.g. DC power supply) of the measuring target in the CDV-40A card, thus causing system failure and a fire hazard.

Note

When using a voltage and strain sensor input signals together in the same CDV-40A card, a cross talk may generate to display a waveform different from a sensor input waveform on the strain sensor connected channel.

[Worst case]

If the worst comes to the strain sensor input channel with the following conditions, a cross talk of $120 \mu\text{m}/\text{m}_{\text{p-p}}$ may generate.

(Conditions) Voltage input channel

- Mode Voltage
- Range 10 V
- LPF FLAT
- Input Square-wave of $20 \text{ V}_{\text{p-p}}$

Strain sensor input channel

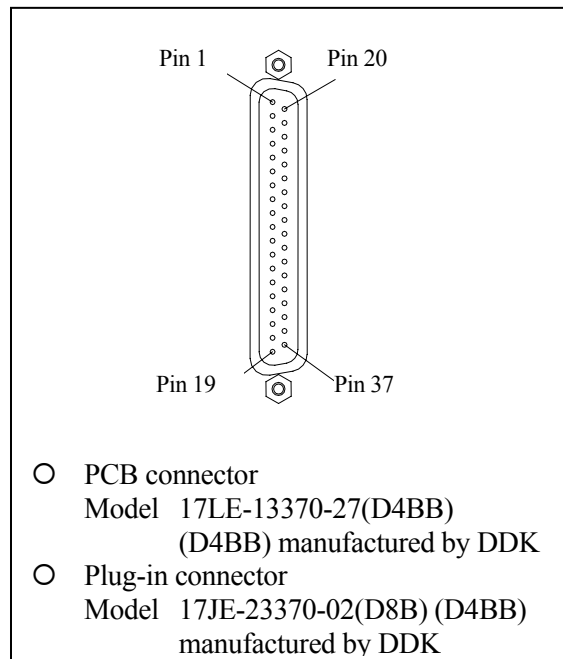
- Mode Strain
- Range $500 \mu\text{m}/\text{m}$
- LPF FLAT
- Input Arbitrary

At this time, set the LPF of the strain sensor input channel to less than 10 kHz to eliminate the cross talk.

3-4 CONNECTING DIGITAL INPUT CARD

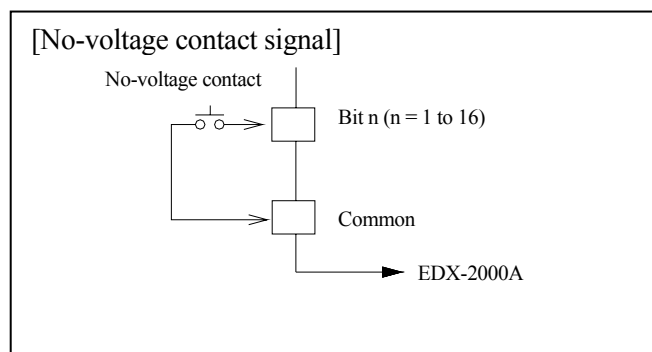
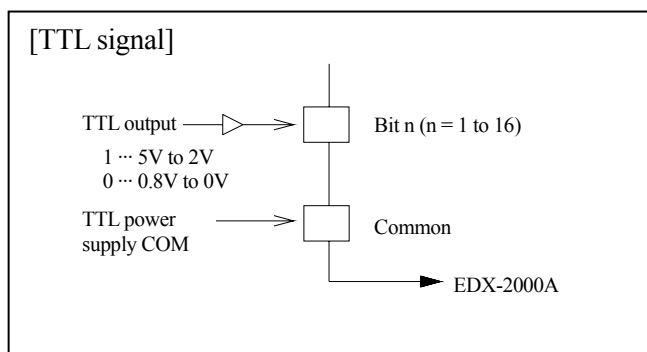
The pin assignment of the digital input card is as shown in the table and figure below:

Pin No.	Name	Pin No.	Name
1	Bit 1	20	Common
2	Bit 2	21	Common
3	Bit 3	22	Common
4	Bit 4	23	Common
5	Bit 5	24	Common
6	Bit 6	25	Common
7	Bit 7	26	Common
8	Bit 8	27	Common
9	Bit 9	28	Common
10	Bit 10	29	Common
11	Bit 11	30	Common
12	Bit 12	31	Common
13	Bit 13	32	Common
14	Bit 14	33	Common
15	Bit 15	34	Common
16	Bit 16	35	Common
17	Not connected	36	Common
18	Common	37	GND
19	GND		



[Note] The signal common is used in common for bits 1 to 16, and is insulated from the casing and the power supply of the main unit.

Connect the TTL signal or no-voltage contact signal, as shown in the figures below:



NOTE

The input signal between each bit and the common should be within the range of -30 to +30. The digital input card may fail if a voltage exceeding that range is applied.

MEMO

A terminal board type of input printed circuit board is available.

Model: EDX-DIT

Overview: The EDX-DIT consists of the FTP-36H (98) (input terminal printed circuit board) (CONTEC made) and connector cables, and allows the input of signals from the digital input card through the terminal.

4. MEASUREMENT

4-1 MEASUREMENT

After connecting the sensor, turn ON the EDX-2000A power switch. For details for settings of the conditioner and measuring conditions, see the Instruction Manual for Software.

4-2 POWER OFF

To turn OFF the power after the measurement process is completed, always return to the main menu, then turn OFF the EDX-2000A power switch. When turning OFF the power switch, take the following precautions:

NOTE

When the POWER switch is turned OFF, do not disconnect the power plug from the power outlet or DC power supply until the system automatically shuts OFF the power. Once you turn OFF the POWER switch, do not operate the POWER switch again until the power is shut OFF. Failure to observe these precautions may destroy the internal hard disk and prevent the EDX-2000A from starting again.

4-3 INTERNAL BATTERY

The EDX-2000A is equipped with an internal battery to cope with the event of a momentary power loss. When the power is shut OFF or the power cable is disconnected from the EDX-2000A while the system is operating via the AC or DC power supply:

- 1) The buzzer is produced and the status display LEDs light up alternately in red and orange.
- 2) If the internal battery is fully charged, it will supply power for approximately two minutes. After two minutes, the internal data is saved and the internal program will shut down.
If the power is recovered within two minutes, items (1) and (2) are automatically cancelled. When the power is not recovered after two minutes, turn OFF the power switch once and ensure that the power supply for the EDX-2000A is shut OFF. Correctly connect the AC or DC power supply to return to normal condition, and turn ON the power switch.

NOTE

The EDX-2000A has an internal battery that maintains operation in the event of a momentary power loss. However, the internal battery is provided for supplemental purposes only. The power supply to the main unit may be lost in less than two minutes if the internal battery becomes old or is not fully charged. Therefore, avoid using the EDX-2000A under conditions in which the power supply may be lost at any time. Replace the internal battery as soon as it expires (see 7-2, “REPLACEMENT OF INTERNAL BATTERY (Ni-Cd battery)”). The battery’s expiration date is indicated at the rear of the EDX-2000A.

MEMO

It is recommended to refresh the battery about once each month in order to maintain the battery capacity. The battery can be refreshed by selecting the following:

Select <Battery> from <Environment> main menu on the initial screen.

For details on how to handle the battery, see the Instruction Manual for Software.

Note that it takes up to 4.5 hours for refreshing the battery.

5. REMOTE CONTROL UNIT

Parts names and functions of the remote control unit RCU-40A are described below:

1) REC/PAUSE switch

The REC/PAUSE switch has the same functions as those of the sheet key “REC/PAUSE” located on the main unit. Pressing this switch while recording pauses the recording, and pressing the switch while the system is paused starts recording data. Data obtained while the system is paused is saved in memory. To stop recording, press the STOP switch.

2) STOP switch

The STOP switch has the same functions as those of the sheet key “STOP” located on the main unit. Pressing the STOP switch while recording or pausing saves the recorded data and proceeds to the monitoring mode.

3) VOICE MEMO switch

Pressing this switch lets you record voice memo.

When the switch is pressed while “measuring,” the VOICE MEMO LED [5] lights up in red, enabling the recording of the voice memo. The system will simultaneously change to the REC mode.

Voice can be recorded only while the “VOICE MEMO” switch is pressed and the VOICE MEMO LED is lighted up in red.

This switch can also be used as a voice playback button in data reproduction. To play voice, press down this switch for approximately two seconds.

4) REC/PAUSE LED

This LED indicates the state of data recording.

While pausing (PAUSE): The LED flickers in green.

While recording data (REC): The LED lights up in green.

Other than the above: The LED is OFF.

5) VOICE MEMO LED

This LED indicates the state of voice memo recording.

While recording the voice memo: The LED lights up in red.

While stopping the voice memo: The LED is OFF.

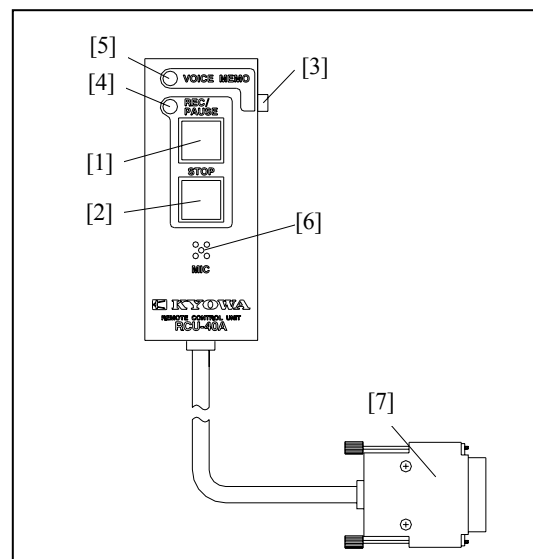
Other than the above: The LED is OFF.

6) MIC

An internal microphone is provided. During voice recording, maintain a distance of approximately 10 cm from the microphone.

7) Connector

Connect the connector to the remote control connector (CONT IN) located at the rear of the main EDX-2000A unit.



NOTE

Always turn OFF the EDX-2000A power switch before connecting the remote control unit RCU-40A.

MEMO

When using the microphone of the remote control for “VOICE MEMO,” go to Environment Settings and select “Remote Control” in Microphone Selection.

By selecting the above setting, voice can be recorded from the microphone of the remote control unit.

6. TROUBLESHOOTING

If the EDX-2000A does not operate as expected or in a stable manner, examine the facts that may be causing such a condition before concluding that the system has failed. Items to be checked and countermeasures for various symptoms are described below. If the problem still occurs even after corrective action is taken, contact KYOWA or our representative.

If the system is damaged due to a cause other than as specified in this Instruction Manual, or if the user has disassembled or modified the system, KYOWA ELECTRONIC INSTRUMENTS may not be able to offer repair service.

6-1 TROUBLESHOOTING FOR THE EDX-2000A

Symptom	Check item and/or countermeasures
When the AC power supply is used, power is not supplied to the main unit. The POWER LED does not light up.	• Does the AC power outlet have the specified voltage? Check the voltage using a tester or the like. See 3-2, "CONNECTING THE POWER SUPPLIES." • Is the power cord securely connected? • Has the fuse blown? A spare fuse is provided in the AC inlet socket. If you find a blown fuse, the cause of the problem should be removed before the fuse is replaced.
When the DC power supply is used, power is not supplied to the main unit. The POWER LED does not light up.	• Does the DC power supply have the specified voltage? Check the voltage using a tester or the like. See 3-2, "CONNECTING THE POWER SUPPLIES." • Is the power cord connected securely? • Has the DC fuse blown? A spare fuse for the DC power supply is provided in the main unit. If you find a blown fuse, the cause of the problem should be removed before the fuse is replaced.
The color of the POWER LED is not "green."	• It is normal. See 2-1, "FRONT."
After the power supply is turned ON, the POWER LED lights up normally but the initial screen of the EDX-2000A is not displayed.	• If the EDX-2000A interfaces (SCSI, LAN, USB, keyboard and mouse) are connected, turn OFF the power supply, remove all connections, and then turn ON the power supply. If the initial display doesn't appear even after the power supply is turned on again, an internal hard disk failure is suspected. Contact KYOWA or our representative.
"UNKNOWN" is displayed in Card Type of the initial screen of the EDX-2000A.	• After turning OFF the power supply, remove all connectors from the conditioner card of EDX-2000A, and then turn ON the power. If the normal display appears on the screen, a sensor input error is suspected. See 3-3, "CONNECTING SENSORS." If the name of the card installed in the conditioner is not displayed even after the power ON again, contact KYOWA or our representative.
When measuring, no data recording is started, paused or stopped even if the "REC/PAUSE" or "STOP" switch is pressed.	• The "REC/PAUSE" or "STOP" switch signal is accepted at intervals of about two seconds. Do not press the switch too quickly.

Symptom	Check item and/or countermeasures
The remote control was used to record a voice memo, but no voice was recorded.	- Check the microphone that has been selected for voice recording. Go to Environment Settings and select “Remote Control” in Microphone Selection. - Change the voice volume (“0” is minimum; “127” is maximum). Environment Settings → Voice Volume → Change
When playing the recorded VOICE MEMO, the beginning part of the voice memo cannot be heard.	Voice recording starts after the “REC LED” lights up in red. Confirm that the “REC LED” is lit in red before starting voice input.

6-2 TROUBLESHOOTING FOR STRAIN/VOLTAGE MEASUREMENT CARD CDV-40A

Symptom	Check item and/or countermeasures
“***” is displayed in Card Type of the initial screen even if the card is installed.	Pull out the conditioner card and check for any bent connector pins located on the other side of the panel. If the connector pins are bent, correct the problem and install the card, then confirm that the card type is displayed. If the same display still appears even after the problem is remedied, please contact KYOWA or our representative for service.
A balance cannot be achieved.	Is OFF selected for the BAL item in the conditioner settings? If “OK” doesn’t appear even if “ON” is selected, it is suspected that there is a sensor that is not connected to the input, there is a sensor error or the sensor input is unstable.
Excessive noise is present in the waveform display.	- Is the GND terminal of the EDX-2000A grounded? - When using the strain gage, noise may be reduced by connecting the GND terminal of the EDX-2000A and the test specimen to which the strain gage is attached. See 3-3, “CONNECTING SENSORS.” - Is there an inverter motor, machining equipment, welder or AC power supply for power systems placed near the input cable for the EDX-2000A? If so, move the input cable apart from the power source. - Set low pass filter to reduce noise. Set cutoff frequency of the low pass filter to about 2 to 5 times the frequency of the input signal. (Example: If the input is DC to 100 Hz, select a cutoff frequency of 300 Hz.) If input signals change abruptly, set the parameter to about 10 times the frequency of the input signal.

7. MAINTENANCE

7-1 MAINTENANCE DESCRIPTIONS

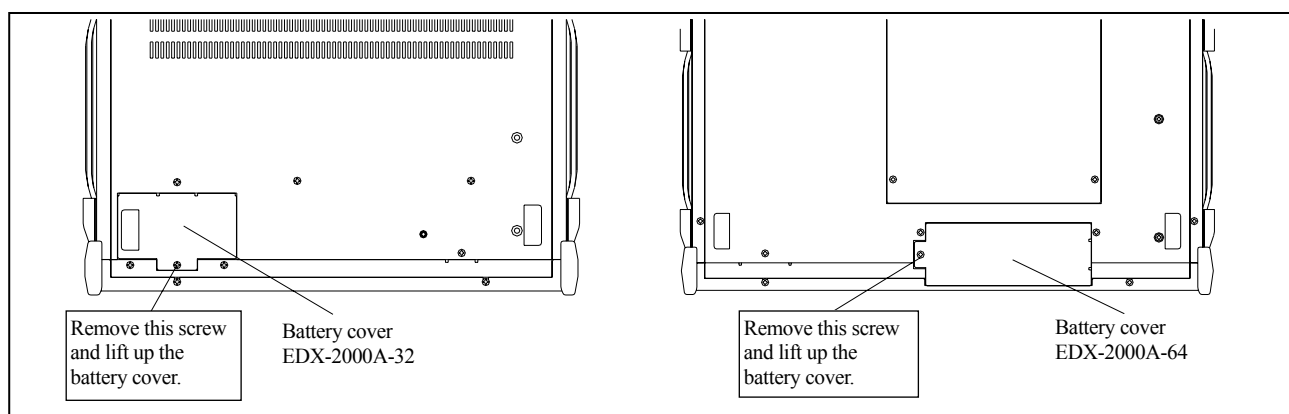
The following items are provided for scheduled maintenance for the EDX-2000A.

Maintenance service are performed at the intervals specified below:

Item	Description	Service intervals
Replacement of internal Ni-Cd battery used in the event of a momentary power failure	The life of an Ni-Cd battery is approximately 1 year. Replace the battery within 1 year or, the battery capacity becomes short. The expiration date is indicated on a label affixed to the rear of the main unit. See Section 7-2, "REPLACEMENT OF INTERNAL BATTERY (Ni-Cd battery)," for details on battery replacement.	Once a year
Replacement of internal hard disk	The internal hard disk is a mechanical part that may be deteriorated due to vibration and impact applied during operation. It is recommended to replace the internal hard disk once every 2 years. The internal hard disk must be returned to KYOWA for replacement.	Once every 2 years
Evaluation of accuracy of the internal conditioner card	An annual inspection is recommended to ensure the accuracy of the internal conditioner card. The conditioner card must be returned to KYOWA for the scheduled inspection.	Once a year

7-2 REPLACING INTERNAL BATTERY (Ni-Cd battery)

The Ni-Cd battery should be replaced with the power supply OFF and the AC or DC power cable disconnected. First, remove the screws from the bottom surface of the EDX-2000A and take out the Ni-Cd battery. Remove the terminals connected to the Ni-Cd battery and reconnect them to a new battery, insert the new battery, replace the battery cover and screw it securely in place. Contact KYOWA or our representative for information when purchasing a new battery.



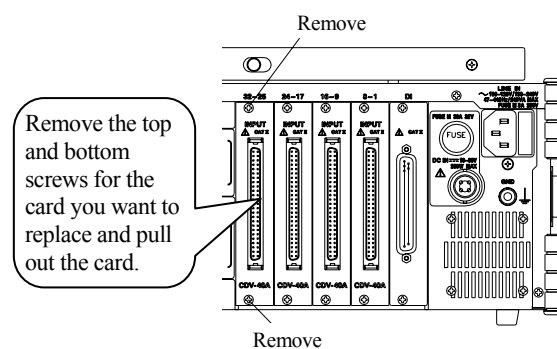
NOTE

The EDX-2000A is operated by Ni-Cd battery which is recyclable valuable resource. When disposing the used battery, provide the battery for recycling.

7-3 REPLACING CONDITIONER CARD

To replace the conditioner, turn OFF the power and take the following steps:

- 1) The screws located at the top and bottom of the conditioner panel.
- 2) Pull the conditioner outward slowly.
- 3) Slowly push in the new replacement card along the guide rail in the casing, and then tighten the screws at the top and bottom of the conditioner.
- 4) After replacing the conditioner card, power ON the EDX-2000A and check the startup screen. If the Card Type is displayed in Slot No. corresponding to the conditioner that was replaced, it means the conditioner replacement was performed properly. If the EDX-2000A is not operating properly, “***” is displayed in Card Type as shown in the figure at right. At this time, remove the card and reinsert the conditioner card once again.



Slot No.	Card Type
1	CDV-40A
2	CDV-40A
3	* * *

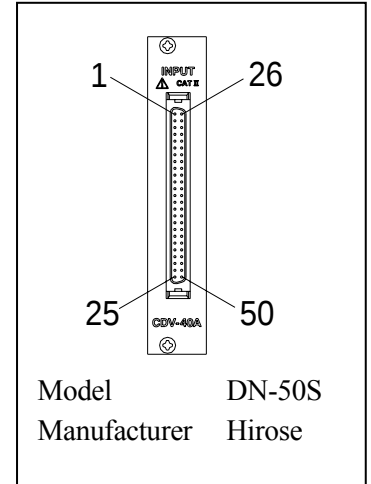
Conditioners (CDV-40A) are present in slots 1 and 2.

The conditioner does not exist in slot 3 or the system is not functioning properly.

8. CONNECTOR PIN ASSIGNMENT

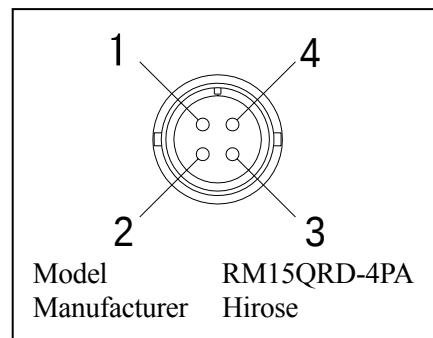
8-1 CDV-40A GROUP CONNECTOR

Pin No.	CH	Name	Pin No.	CH	Name
1	1	+BV	26	1	-IN
2		-BV	27		+IN
3		COM	28		ID
4	2	+BV	29	2	-IN
5		-BV	30		+IN
6		COM	31		ID
7	3	+BV	32	3	-IN
8		-BV	33		+IN
9		COM	34		ID
10	4	+BV	35	4	-IN
11		-BV	36		+IN
12		COM	37		ID
13	5	+BV	38	5	-IN
14		-BV	39		+IN
15		COM	40		ID
16	6	+BV	41	6	-IN
17		-BV	42		+IN
18		COM	43		ID
19	7	+BV	44	7	-IN
20		-BV	45		+IN
21		COM	46		ID
22	8	+BV	47	8	-IN
23		-BV	48		+IN
24		COM	49		ID
25	-	Shield	50	-	Shield



8-2 DC POWER SUPPLY CONNECTOR

Pin No	Name
1	Positive side
2	Positive side
3	Negative side
4	Negative side



NOTE

The “negative side” of the DC power supply connector is connected to the casing. See 3-2-2, “Connecting the DC Power Supply.”

9. HARDWARE SPECIFICATIONS

9-1 OVERALL SPECIFICATIONS

1) Models

Model	Maximum analog inputs (channels)	Number of slots
EDX-2000A-32	32	4
EDX-2000A-64	64	8

[Note] Number of slots: Number of slots for conditioners

- 2) Number of input channels Maximum 32 channels for EDX-2000A-32 (when four CDV-40A cards are installed)
Maximum 64 channels for EDX-2000A-64 (when eight CDV-40A cards are installed)
- 3) Analog input For details, see the specifications for the internal conditioner card.
- 4) Digital input 16 bits, TTL level, contact input
- 5) Voice input 1 channel (Voice memo inputs received during data recording can be recorded with measured data.)
- 6) Number of output channels For details, see the specifications for DA card.
- 7) Sampling frequency All channels simultaneous
Sampling method 1 Hz to 200 kHz (1,2,5 system): When recording data up to 16 channels
Sampling periods 1 Hz to 100 kHz (1,2,5 system): When recording data up to 32 channels
1 Hz to 50 kHz (1,2,5 system): When recording data up to 64 channels
1 Hz to 10 kHz (1,2,5 system): When realtime simultaneous processing is enabled
- 8) Data recording capacity 30 gigabytes or more (when a hard disk is used)
- 9) Display 10.4 inch built-in color LCD or equivalent (used for parameter settings and graphical/numerical data monitoring, etc.)
- 10) Control keys Key panel provided on the main unit and external keyboard
- 11) External control connectors CONT IN, CONT OUT (for remote control unit and synchronous operation)
- 12) Interface slot PC card slot (Type II PCMCIA Ver. 4.2, used for the offline transfer of recorded data)
- 13) External equipment interfaces
- [1] Keyboard interface 6-pin mini DIN connector for connecting the US 101 keyboard
 - [2] External display interface VGA connector (15-pin connector for monitor)
 - [3] USB interface USB 1.1 (for connecting an external MO)
 - [4] LAN interface 10/100BASE-TX (for transferring the recorded data)
- 14) Power supply 100 to 120 VAC, 190 to 240 VAC, 10 to 30 VDC (for both AC/DC)
An internal battery is provided to maintain power in the event of a momentary loss of power when the DC power supply is used.
- 15) Operating temperature and humidity ranges 0 to 40°C, 20 to 80%RH (no condensation)
- 16) Storage temperature range -20 to 60°C
- 17) Vibration resistance 29.42 m/s² (3 G), 5 to 55 Hz (when in operation)
49.03 ms² (5 G), 5 to 55 Hz (when not in operation)
- 18) Impact resistance 196.1 m/s² (20 G)/11 ms

- 19) Outside dimensions EDX-2000A-32: 350 mm (W) × 132 mm (H) × 300 mm (D) (not including protrusions)
 Approx. 12 kg (with a 16-channel CDV type conditioner installed)
 EDX-2000A-64: 430 mm (W) × 156 mm (H) × 300 mm (D) (not including protrusions)
 Approx. 15 kg (with a 16-channel CDV type conditioner installed)

9-2 INTERNAL CONDITIONER SPECIFICATIONS

Strain/voltage measurement card: CDV-40A

Item	Strain measurement	Voltage measurement
Number of input channels	Eight channels (group connector)	
Input type	Balanced differential input	Unbalance input
Input resistance	Approx. 10 M ohm	Approx. 1 M ohm
Coupling	DC/AC (DC cut) switching	
Applicable gage factor	2.00	—
Bridge voltage	2.00 VDC ± 2% (120 ohm to 1 K ohm)	—
Balance range	Resistance ± 2.4% ($\pm 12000 \times 10^{-6}$ strain)	—
Measuring range	8 steps 500 $\mu\text{m/m}$, 1k $\mu\text{m/m}$, 2k $\mu\text{m/m}$, 5k $\mu\text{m/m}$, 10k $\mu\text{m/m}$, 20k $\mu\text{m/m}$, 50k $\mu\text{m/m}$ and OFF	8 steps 0.1 V, 0.2 V, 0.5 V, 1 V, 2 V, 5 V, 10 V and OFF
Frequency response range	When setting DC (High Pass Filter OFF) When DC is cut (when setting High Pass Filter to 0.2 Hz to 1 Hz)	DC to 50 kHz, +1 dB and -3 dB deviations 0.2 Hz or 1 Hz to 50 kHz (See the column for the high pass filter)
Low pass filter	Transfer characteristics Cutoff frequencies: Eight steps Amplitude ratio of cutoff point Attenuation characteristics	Secondary Butterworth 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz and F (Flat) -3 dB ± 1 dB -12 dB/octave
High pass filter (DC cut)	Cutoff frequencies 2 steps 0.2 Hz and 1 Hz Attenuation characteristics -6 dB/octave	
AD converter resolution	16 bits	

9-3 REMOTE CONTROL UNIT RCU-40A SPECIFICATIONS

- 1) Model RCU-40A
- 2) Control functions [1] “REC”: Start data recording
 [2] “PAUSE”: Pause data recording
 [3] “STOP”: Stop data recording
 [4] “VOICE MEMO”: Used for recording and playing voice (recording starts when the switch signal is recognized)
- 3) Display The LED display allows the user to distinguish whether data recording is in progress, data recording is paused, voice is being recorded or data recording has been stopped.
- 4) Cable length Approx. 1.5 m

10. SOFTWARE SPECIFICATIONS

10-1 SETTING MEASURING CONDITIONS

- | | |
|--|---|
| 1) Measuring channel conditions | Parameters are set for the channels to be used, as well as the range, high pass filter (DC cut), low pass filter, calibration coefficient, offset, unit and channel name. |
| 2) Measuring mode | |
| [1] Manual measurement | Data recording using panel keys or the remote control unit. |
| [2] Interval measurement | Automatic data recording is performed at specified intervals. |
| [3] Trigger measurement | Automatic data recording is performed according to the trigger channel(s) and trigger conditions. |
| 3) Sampling frequency | The sampling frequency is set. |
| 4) Recorded data | Free space on internal hard disk: Sampling rate ranges from 1 kHz to 10 kHz.
2 to 2 gigabyte data sets (data recording channels × recorded data)
When sampling rate exceeds 10 kHz. |
| 5) Test information | Test title, comment and item/description |
| 6) Saving and loading measurement conditions | |

10-2 MEASUREMENT/DATA RECORDING

10-2-1 Monitoring

- | | |
|---------------------------|---|
| 1) Monitoring types | Numerical display, time axis graph, bar graph and relative (X-Y) graph |
| [1] Numerical monitoring | Measurement data is numerically displayed. |
| [2] Time axis (Y-T) graph | 1 graph per screen, 2 graphs per screen, 3 graphs per screen and 4 graphs per screen |
| [3] Bar graph | For all channels (a maximum of 64) |
| [4] Relative (X-Y) graph | One graph per screen and two graphs per screen
Four pairs (channels) of relative plots can be drawn in each graph. |
| 2) Data check | |
| [1] Raw data check | Acquired data is checked (time axis graph). |
| [2] MAX/MIN data | Data (± 200 data items) near the maximum and minimum of the recorded data is viewed in graphical format. |
| [3] Histogram graph | The results of simultaneous histogram processing are viewed in the histogram. |

10-2-2 Simultaneous Processing

- | | |
|-------------------------------------|--|
| 1) Types of simultaneous processing | Histogram processing
Only one type can be selected for each measurement channel during monitoring or data recording. |
| 2) Histogram analysis | |
| [1] Types of histogram analysis | 5 types Max/Min + Rain1D, P/V, Max/Min, Rain1D and Rain2D
(Max/Min = Maximum/minimum value method, Rain1D = 1-dimension rainflow method, Rain2D = 2-dimension rainflow method, and P/V = Peak/Valley method). |
| [2] Number of slices | 1-dimension: 16 (± 8), 32 (± 16), 64 (± 32), 128 (± 64) and 256 (± 128)
2-dimension: 16 (± 8) and 32 (± 16) |
| [3] Hysteresis | 2 to the preset number of slices |

10-3 DATA REPRODUCTION

10-3-1 Graph Display

- 1) Graph types
 - [1] Time axis (T-Y) graph 1 graph per screen, 2 graphs per screen, 3 graphs per screen and 4 graphs per screen
 - [2] Relative (X-Y) graph 1 graph is provided per screen, and 8 pairs (channels) of relative plots can be drawn.
- 2) Graph display conditions Display channel, graph scale, number of displayed data items, additional line, etc.
- 3) Graph controls Scroll, Cursor Movement and Display Value, Zoom In/Zoom Out, Display All Data/Zoom, Play VOICE MEMO, etc.
- 4) Saving and loading of display conditions

10-3-2 Editing Data File

- 1) Edit data Change and/or edit recorded data. (The number of data items that can be edited at once is limited.)
- 2) Edit header Change header information for recorded data (data recording time, calibration coefficient, offset, unit, file comment and channel name).
- 3) Save file Save the edited data in a different file.
- 4) Cut and save Save arbitrary data area of the recorded data file in a different file.
- 5) Convert to ASCII Convert the recorded data to the CSV format and save.

10-3-3 Statistical Processing

Display and save the maximum value, minimum value, average value and standard deviation of the recorded data.

10-4 ANALYSIS PROCESSING

10-4-1 Arithmetic Operations

Arithmetic operations are performed between the arbitrary channels in maximum 2 recorded data files, and the operation results are saved in a specified file.

1) Setting items

- | | |
|-----------------------------------|--|
| [1] Calculation target file name | 1 (A) or 2 (A and B) recorded data files should be specified.
If 2 files are specified, those recorded data files should have the same sampling frequency. |
| [2] Calculation results file name | Specify the file name for saving the results of the arithmetic operations.
The results of the arithmetic operations should have the same format (KS2) as that of the recorded data file. |
| [3] Calculation target channel | Analog channels only (A01 to A64 and B01 to B64).
Example of channel display
“A06”: Represents channel No. 6 of file A.
“B28”: Represents channel No. 28 of file B. |
| [4] Calculation result channel | Channels of arithmetic operations result: Maximum 32 channels (C01 to C32)
(C**, where ** represents expression describing channel)
Example of channel For “C06”
Expression $f()$ is specified by $C** = f(A**, B**)$ used for saving calculated results obtained from $C06 = (expression)$. |
| [5] Expression | Specify the expression of $C** = f(A++, B**)$
Expression should be within 60 digits.
Up to 32 expressions (calculation result channels) can be set. |
| [6] Unit | Engineering units can be specified for the calculation result. |
| [7] Channel name | Comment for the calculation result channel. |

2) Operators and expressions

- | | |
|--|---|
| [1] Addition, subtraction, multiplication and division operators | $+$, $-$, $*$, $/$, SQR, ABS, SIN, COS, TAN, ASIN, ACOS, ATAN, LOG, LN, EXP and rosette function |
| [2] Others | No variables is be used.
$+$ and $-$ can also be used as signs (e.g. -5.7, -A15).
The calculation result (channel) cannot be used for the expression in another calculation result channel.
Recursive processing cannot be performed.
(Example: $C10 = C01 + C02$ and $C12 = C12 + 3.1415$ cannot be used.) |

3) Saving and loading of calculation operations conditions

10-4-2 FFT Analysis

FFT analysis is conducted for arbitrary channel data of the recorded data and the results are saved in a specified file. The results can be viewed in graphical format.

- 1) Types of FFT analysis
Linear spectrum, power spectrum, cross spectrum, auto correlation and cross correlation
- 2) Analysis conditions
 - [1] Analysis types
Linear spectrum, power spectrum, cross spectrum, auto correlation and cross correlation
 - [2] Analysis target channel
One or two channels (depending on the type of analysis)
 - [3] Filter
Low pass filter may be used for the pre-processing of FFT analysis.
 - [4] Integration
Data integration may be performed for the pre-processing of FFT analysis (once/twice).
 - [5] Analysis data
256, 512, 1024, 2048, 4096, 8192, 16354 and 32768 items
 - [6] Window function
Off (square window), Hanning, Hamming, Fejer, Blackman and Gaussian
 - [7] Average times and shift data
Average of FFT results and number of shift data
 - [8] Analysis start point
The analysis start point for the target data is specified.
 - [9] Analysis result file
The analysis results are saved with the target time series data.
- 3) Analysis results graph
Display a graphical presentation of target time series data and FFT analysis results
Display the cursor, zoom in/out the X axis/Y axis.
- 4) Saving and loading of analysis conditions

10-4-3 Histogram Analysis

Histogram processing is performed for recorded data, and then the processing results are saved in a specified file. The processing results can be viewed as a list or in graphical format.

- 1) Setting items
 - [1] Target channel
Channel(s) are specified to perform histogram processing.
 - [2] Types of histogram processing
 - A) Peak/valley method (P/V)
 - B) Maximum/minimum value method (MAX/MIN)
 - C) One-dimension rainflow method (Rain[1D])
 - D) Two-dimension rainflow method (Rain[2D])
 - E) Amplitude method (AMPLITUDE)
 - F) One-dimensional time at level (TIME[1D])
 - G) Complex: One-dimension rainflow method + Peak/valley method (RAIN&P/V)
 - H) Complex: One-dimension rainflow method + Maximum/minimum value method (RAIN&M/M)
 - [3] Number of slices
1-dimension (A, B, C, E, F, G and H of the above) 10 (± 5) to 256 (± 128)
2-dimension (D of the above) Even numbers of 10 to 50
 - [4] Slice width
A physical value is specified for the width of one slice.
 - [5] Hysteresis
The number of slices subject to masking is specified within the range of Zero to the preset number of slices.
 - [6] Offset
A physical value is set when the maximum/minimum value method is used.
 - [7] Target file for processing
Recorded data file or arithmetic operations file
 - [8] Processing result file
Histogram processing result file

2) Result presentations

[1] Chart

[2] Plots

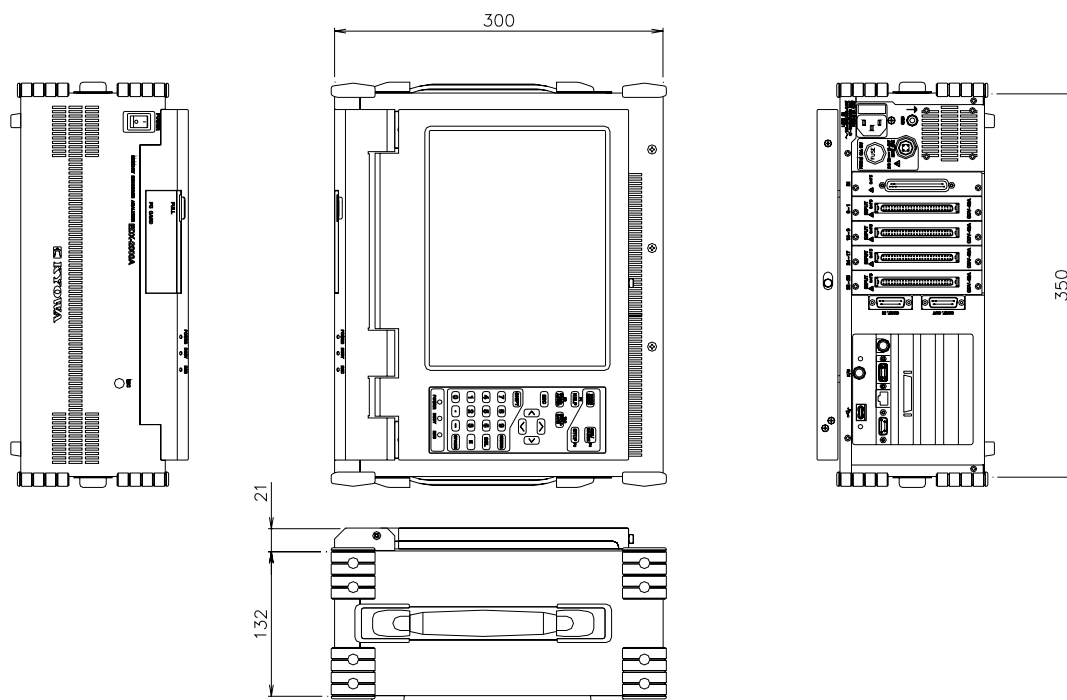
A list of results is displayed for each processing channel.

A histogram graph is displayed for each channel (a 3-dimensional graph is presented for the 2-dimensional type).

11. EXTERNAL VIEWS

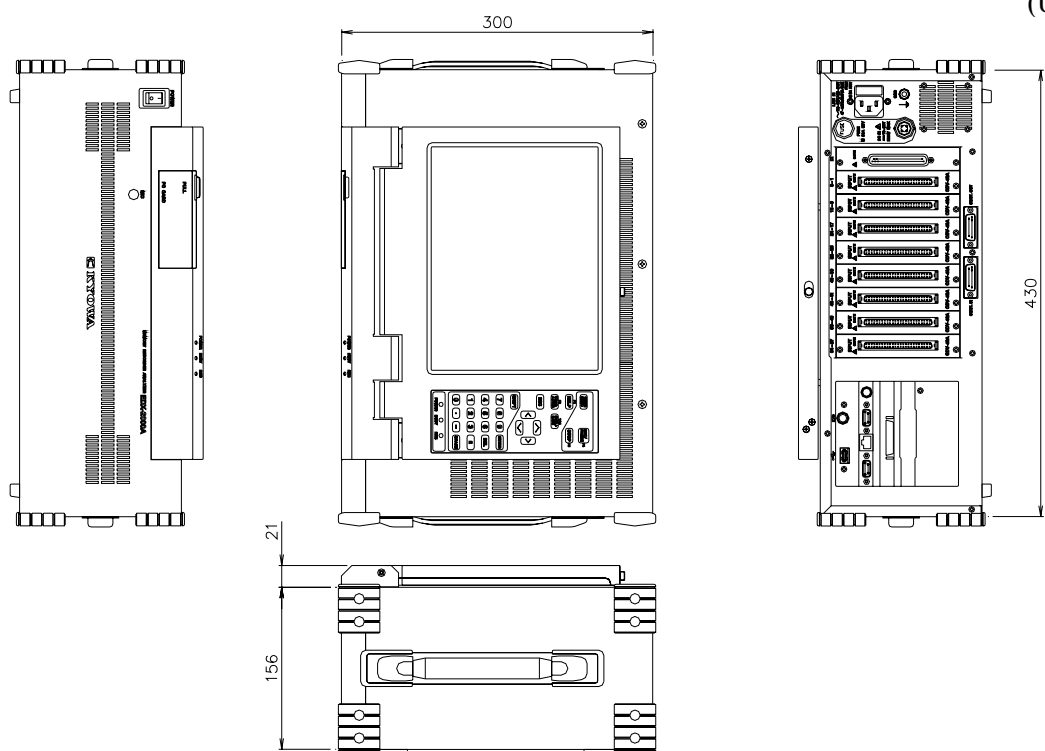
11-1 MEMORY RECORDER/ANALYZER EDX-2000A-32

(Unit mm)



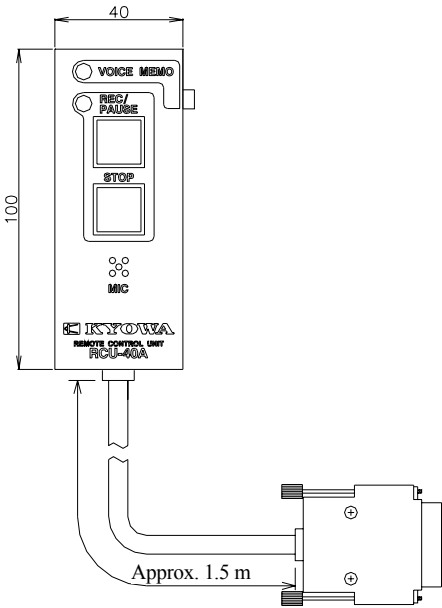
11-2 MEMORY RECORDER/ANALYZER EDX-2000A-64

(Unit mm)



11-3 REMOTE CONTROL UNIT RCU-40A

(Unit mm)



11-4 STRAIN/VOLTAGE MEASUREMENT CARD CDV-40A

(Unit mm)

